PROGRAMMING
This decoder supports all programming methods including: register, paged CV, direct CV, and programming on the main (ops mode programming).

**CV Register** | **Description** | **Range** | **Default**
--- | --- | --- | ---
CV2 | RI | Short address | 1-127
CV3 | RI | Acceleration | 0-32
CV4 | RI | Deceleration | 0-32
CV5 | --- | Top voltage | 0-32
--- | RI | Page number | ---
CV26 | RI | Basic configuration | ---
CV27 | RI | Manufacturer version number | ---
CV8 | RI | Manufacturer ID | ---
CV17 | --- | Long address upper byte | 192-231
CV18 | --- | Long address low byte | 0-255
CV19 | --- | Advanced consist address | 0-127
CV21 | --- | When CV21=0, all accessory functions will follow its own address. When CV21=1, all functions will follow the consist address | ---
CV49 | --- | Horn type | 0-1
CV51 | --- | Horn volume | 0-3
CV52 | --- | Bell type | 0-1
CV53 | --- | Bell volume | 0-3
CV54 | --- | Bell ring rate | 0-30
CV55 | --- | Diesel rumble volume | 0-3
CV56 | --- | Brake squeal volume | 0-3
CV57 | --- | Dynamic brake volume | 0-3
CV58 | --- | Air release volume | 0-3
CV59 | --- | Air pump volume | 0-3
CV60 | --- | Safety pop valve volume | 0-3
CV61 | --- | Engine cooling fan volume | 0-3
CV62 | --- | Coupling volume | 0-3
CV63 | --- | Random noise volume | 0-3
CV64 | --- | Rail talk black | 0-3
CV105 | --- | User identification number | 0-255
CV106 | --- | User identification number | 0-255
CV112 | --- | Exhaust volume | 0-3
CV113 | --- | Coupling fire volume | 0-3
CV114 | --- | Light brightness (green, brown) | 0-12
CV115 | --- | Auto brake squeal enable/disable | 0-1
CV116 | --- | Coupling sound type | 0-2, 2=off
CV117 | --- | Lights selectable | 0-1
CV118 | --- | Accessory light configuration | 0-6
CV119 | --- | Accessory light #2 configuration | 0-6
CV120 | --- | Brake release volume | 0-3
CV122 | --- | Diesel sound type (0=off, 1=rpm & notch synchro to speed, 2=linear rpm synchro to speed, 3=notch up/down) (RF=notch down, PI=notch up)) | 0-3
CV124 | --- | Speed curve select (0=linear, 1=slow increase at slow speed, 2=fast increase at slow speed | 0-2
CV125 | --- | Factory default setting Programming to 1 & 8 | ---

NOTE: Due to limitations in older DCC systems, some of the sound functions or light effects functions may not be accessible. ALSO, you might be limited to factory default CV values.

LIGHT EFFECTS WIRING
Your MRC Synchronized Diesel Sound Decoder is equipped with normal directional lighting, plus MRC light effects. If your loco has ditch lights, mars light or strobe light, you can solder wires to the four solder tabs (2 pairs marked with ACC1,ACC2) on the bottom of the decoder. The two center solder tabs are the common for the accessory light effects.

All the decoder's light outputs are track output voltage (around 14V) supplied by your DCC system. They are designed for 12V light bulb. Please contact your loco manufacturer for lights' operation voltage. If you have a 1.5V bulb use 1k ohm resistor or LED, you should connect a 2k ohm resistor in series to one of the leads to limit current.

TROUBLE SHOOTING
The MRC 0001657 HO diesel sound decoder should perform well with all DCC systems. See your DCC system manual to learn how to program and operate the decoder. For more information about register/CVs and their functions, please refer to the NMRA DCC Standard & Recommended practices, RP-9.2.2 this is available directly from the NMRA or their website at www.nmra.org.

Due to the nature of all sound decoders, the CV read back is not 100% correct. This is not a defect of the decoder or your DCC. Whenever the decoder doesn't work please use program track to re-program the loco address or program CV# 125 with value 1 to restore the decoder to factory setting. This should bring the decoder to life.

FCC COMPLIANCE
This device complies with part 15 of FCC rule. Operation is subject to the following two conditions. (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that cause undesired operation.

RETURN PROCEDURE
If it should become necessary to return your decoder, unplug the decoder and return the decoder only. Please include a letter (printed clearly) with your name, address, a daytime telephone number, and a detailed description of the problem you are experiencing. Please also include a $15.00 check to cover shipping and handling. Be certain to return only the decoder.

Warranty does not include abuse, neglect, or using this product for anything other than it's intended purpose. Warranty coverage will be handled on a case by case basis, and other charges may apply for repair/replacement of the product.

Send the decoder to:

Model Rectifier Corporation
Attn: Parts & Service
80 Newfield Avenue
Edison, NJ 08837-3817 U.S.A

HO Gauge Synchronized Diesel Sound Decoder with 28 Accessory Functions

Item #0001657

Thank you for purchasing our highly advanced DCC locomotive sound decoder. Combined with any DCC System, our new decoder with "Carnegie Hall" sound quality will make your model railroad come to life.

- Synchronized diesel prime mover with randomly associated locomotive sounds
- 1.5 amp capacity
- Programmable choice of 2 different horns and 2 bells
- Programmable individual sound volumes
- Programmable for either 2-digit (1-127) or 4-digit (1-9999) addresses
- Programmable start volume
- Programmable acceleration rate
- Programmable deceleration rate
- Programmable top voltage
- Programmable 14, 28, 128 speed steps
- Selectable factory default speed curve
- Directional lighting (FO) at 0.2 amp rate
- Programmable for either ditch lights, mars light, gyra light andprime strobe light
- 28 accessory functions (F1-F28)
- Supports advanced consisting (CV19)
- Supports programming on the main (OPS mode)
- Compatible with NMRA DCC standards
- NMRA 8 pin plug included for easy installation
- Complies with Part 15 of FCC
- 20mm speaker with baffle included (other size, aftermarket speakers are available from MRC)
- Dimensions: 46.0mm x 17.5mm x 5.0mm
- The decoder can be upgraded to all the horns included in the Demo F19, and more choices of bells.

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80 NEWFIELD AVENUE
EDISON, NJ 08837-3817 Printed in USA
INSTALLATION
It is quite a challenge to install a decoder into a loco. You should have some basic electrical knowledge and soldering skills. If you do not have the above requirements, please ask the dealer for help in installation.

Figure 1 shows the electrical circuit of most standard locos. The terminals of the motor and light(s) are directly connected to the wheel pickup. Each type of loco has its own method of electrical pickup and distribution. The connection between the wheels, motor and light(s) could be wires, clips, the body or chassis, PC board or any other type of conductor. First, figure out your loco’s electrical wiring and how to disconnect (isolate) the motor and light(s).

Figure 1. Connection of standard locomotive.

The decoder will be inserted between the wheel pickup and the motor.

Each manufacturer and loco may have different ways of decoder installation. There is no standard rule for installing decoders. It is always better to consult the loco manufacturer on how to install a decoder in that particular loco.

Figure 2 shows how to wire the decoder. After disconnecting the motor terminals from the pickup, connect the red wire to the right side pickup and the black wire to the left side pickup. Connect the orange wire to the motor terminal that was originally connected to the right pickup. Connect the gray wire to the motor’s other terminal. Connect the front light to the blue wire and the white wire. Connect the rear light to the blue wire and the yellow wire.

The blue wire is the common terminal for lights and accessory functions. You may use the black wire or the red wire to replace the blue wire. This is useful when isolating one of the light terminals from the pickup is difficult. Wiring the bulb this way will make the light dimmer. If your loco has only a front light, you should connect the white and the yellow wires together. If your loco has a NMRA 8 pin receptacle, remove the dummy plug. Match first pin and plug in the decoder.

MAKING A TEST TRACK
Before you begin decoder installation, we strongly recommend building a test track with a 27 ohm resistor to limit current. Only test your installed decoder on the test track. The test track may prevent damage from an incorrectly installed decoder.

The program track is NOT a test track. The program main track does not use a current limiting resistor. So it can’t protect an incorrectly installed decoder.

The decoder will be inserted between the wheel pickup and the motor.

Figure 2. 0001657 decoder wiring diagram

TESTING
All MRC decoders have been factory programmed with address #3, 28/128 speed steps and maximum top voltage. Never run the installed decoder on your layout without first successfully running on test track. Otherwise, you may damage the decoder if it is not wired correctly or if you have not properly isolated the motor and lights.

To test, place the loco on the test track. Select the “Run” mode of your DCC system and select or acquire address #3. Move up the throttle and the loco should move forward. Push the light button [F0] and the front headlight should come on. Change the direction of the loco and the loco should change direction and the rear headlight (if equipped) should come on. The loco cannot reach full speed, due to the resistor. If all above occurs, you passed the test. Congratulations!

Do not run the loco for an extended period of time on the test track or the resistor will overheat.

If your installed decoder does not pass the test, find the problem, correct it and test it again. As long as you test the decoder on the test track there is little chance of damaging the decoder. That is why the test track is so important. Also do not confuse a test track with a program track. A program track does not use the current limiting resistor. Sound decoders need full power to the program track to install all programming instructions.

OPERATION
This decoder can be operated with the diesel sounds on or off. It can also be used in an Electric Type Traction Loco such as Trolley or GG-1 by turning off diesel sounds. To turn off the diesel prime mover sounds, program CV #122 with value 0.

If your DCC system supports higher functions, F18 and F19, you can use these functions to change the type of bell sound, (F18), or horn sound, (F19) on the move without having to go into ‘OPS mode’ programming or by changing CV values.

This decoder supports the new NMRA protocols that use function 28, (F28). Right now only MRC Prodigy2 has 28 functions. There are many more program features available with this decoder. Please refer to the CV Chart to explore other features of the decoder. If you don’t use MRC Prodigy you may not be able to access all the features of the decoder.

DEIESEL SOUNDS CHART

| Function | Idle/Moving | Double click F0 | Sound on/off | Bell on/off | F2 | Horn | F3 | Air release sound/Accessory light #1 on/off | F4 | Air hose firing | F5 | Brake release (Idle) / Brake squeal (moving) | F6 | Dynamic brake on/off | F7 | Uncoupling lever | F8 | Air hose firing | F9 | Engine cooling fan | F10 | Rail wheel-clack (only moving) | F11 | Traction air compressor | F12 | Sound on/off | F13 | Short air release/Accessory light function #2 on/off | F14 | Coupling crash | F15 | Air pump | F16 | Associated loco sound | F17 | Short air release | F18 | Bell type select (use FT1 to turn off bell after selecting) | F19 | Demo sample horns if upgraded | F20 | Bell ring rate | F21 | Change bell volume (use FT1 to turn off bell after adjustment) | F22 | Change horn volume | F23 | Change diesel rumble volume | F24 | Dynamic brake volume | F25 | Brake squeal volume | F26 | Safety valve pop | F27 | Safety valve pop | F28 | Short air release |

Note: Bell, Dynamic Brake and Rail Wheel Clack cannot play at the same time. If you activate the Bell sound [F1], while either the Dynamic Brake or Rail Wheel Clack sounds are activated, the Bell sound will override the other 2 sounds. Rail Wheel Clack cannot play while the loco is in idle. When you turn off Dynamic Brake and Rail Wheel Clack sound there will be one second delay.

LIGHT EFFECT PROGRAMMING CHART FOR CV#118/119
You would program CV #118/119 to choose the desired light effect. CV118 for ACC1 and CV119 for ACC2. For ditch light both CV118 and CV119 must to 0.

<table>
<thead>
<tr>
<th>CV118/119 value</th>
<th>ACC#1</th>
<th>ACC#2</th>
<th>Light effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-</td>
<td>-</td>
<td>Ditch light</td>
</tr>
<tr>
<td>1</td>
<td>Gyr light</td>
<td>-</td>
<td>Prime light</td>
</tr>
<tr>
<td>2</td>
<td>Marlight</td>
<td>-</td>
<td>Single flash light</td>
</tr>
<tr>
<td>3</td>
<td>Prime flash</td>
<td>-</td>
<td>Double flash light</td>
</tr>
<tr>
<td>4</td>
<td>-</td>
<td>-</td>
<td>Ditch light</td>
</tr>
</tbody>
</table>